

¹ A Territory-Oriented Approach to Operationalize Sustainable Management²

³ Ana Burgos¹ and Alejandro Velazquez²

⁴ ¹ Universidad Nacional Autónoma De México

⁵ *Received: 14 December 2018 Accepted: 5 January 2019 Published: 15 January 2019*

⁶

⁷ **Abstract**

⁸ Sustainable science ultimately seeks to minimize the negative impact of human activities on
⁹ nature, however its role is regarded as limited, chiefly because it lacks a robust spatial
¹⁰ framework to join ecological and social processes. Space, from a territorial perspective, is the
¹¹ result of historical interactions between socio-economic forces governing access to natural
¹² resources. This paper provides a territorial-oriented approach to improve land use policy from a
¹³ spatially explicit perspective. We develop a novel approach, namely ?Territorial
¹⁴ Configuration? implying the dissection of the geographic continuum into territorial
¹⁵ conglomerates. These are delimited by a range of meaningfully socio-historic calliaisonen
¹⁶ compassing a clear understanding of how space is controlled by space holders triggering
¹⁷ proximal and underlying governing processes. We discuss how the territorial configuration
¹⁸ facilitates overcoming pending issues in land use policy, such as, ecological and geographical
¹⁹ articulation, legitimate decisionmaking process, and increase of certainty on the subject of
²⁰ management among others.

²¹

²² **Index terms**— environmental management, sustainable science, territory, geographic continuum, biodiversity
²³ conservation, watershed management.

²⁴ **1 Introduction**

²⁵ Environmental Management (EM) emerged in the 1990s in the light of current man-made pressures on the natural
²⁶ system. It focuses on documenting the relationship between natural resources and human activities and assessing
²⁷ derived proximal and underlying effects on the environment, eventually minimizing the negative impact of human
²⁸ activities. In the last decade, EM has evolved as part of the emerging fields known as Sustainability Science and
²⁹ Transdisciplinary Research. These fields focus on coupled human-environmental systems, science-society links
³⁰ and knowledge systems (Komiyama and Takeuchi 2006; Miller et al. 2014). It is therefore expected that EM be
³¹ reframed in order to fulfill the needs of Sustainability Science and Transdisciplinary Research (Lang et al. 2012).
³² This reframing is critical to gaining insight from previous experiences and eventually in overcoming failures. It is
³³ undeniable that EM has had a positive impact on a number of topics, namely, biodiversity and forest management
³⁴ and environmental services, among others. Even so, EM has revealed barriers and difficulties when applied to
³⁵ real problems, and its role in sustainable science has been regarded as limited (Conacher 2003; Barrow 2006;
³⁶ Fisher et al. 2012). Coordination and collaboration between stakeholders and institutions have been pinpointed
³⁷ as major weaknesses in terms of achieving effective EM (Margerum and Whitall 2004; Margerum 2008; Gregory
³⁸ et al. 2012; Shrag et al. 2015). The goal of recreating EM as an operational framework and eventually as a
³⁹ bridge to other complementary approaches such as resilience, vulnerability and adaptation (Brand and Jax 2007),
⁴⁰ confronts a number of challenges: first, a dissected rather than a unified perception of natural resources (soils,
⁴¹ water, forests and biodiversity, among others) which occur interacting interdependently at all times in all places
⁴² (Fish 2011); second, integrative analysis of past, present and future socio-economic underlying driving forces
⁴³ (Ostrom 2008); third, a robust geographic framework to holistically approach the former and latter challenges

3 ENVIRONMENTAL MANAGEMENT FRAMEWORK

44 (Turner et al. 2003); and fourth, recognized mismatches among stakeholders or agencies across multi-level state
45 and non-state governance, involving issues of legitimacy and equity (Margerum 2008; Moss and Newig 2010;
46 Mikulcak et al. 2013). These last two challenges were clearly identified as cornerstones in most ecological studies,
47 and they have remained insufficiently amended.

48 Space in ecological studies has been approached by dissecting the geographic continuum into vector or raster
49 (pixels) formats (Geoghegan et al. 1998). Other approaches based upon biophysical categories, such as regions,
50 watersheds or aquifers have been used as surrogates for geographic framework (Wu 2006). Neither pixels nor
51 biophysical categories provide a comprehensive understanding of the underlying aspects such as social and
52 governing forces (Liverman et al. 1998). We argue that geographic framework is far more than pure geometric
53 spatial dissection or temporal and functional links and fluxes. Space, from a geographical framework viewpoint,
54 is the result of historical interactions between socio-economic forces governing access to natural resources.
55 Furthermore, space is affected by the presence of E Author ? ?: Centro de Investigaciones en Geografía Ambiental,
56 Universidad Nacional Autónoma de Mexico (UNAM). e-mail: alex@ciga.unam.mx intertwined feelings connecting
57 people with places by establishing limits through political, economic and cultural processes ??Santos 2001;Claval
58 2002). The aim of depicting the geographic continuum is ultimately to establish boundaries. Boundaries are
59 flexible, fuzzy, porous and dynamic. These boundaries, rather than being limited uniquely by biophysical
60 attributes, are depicted by short and long-term social processes from which territories were then derived. In
61 turn, place-based social processes interaction results in a tied liaison between place and the holder who seeks to
62 control access to all resources (Raffestin and Butler 2012).

63 Territory deals with space engagement, rules of control and power relationships and ultimately represents
64 the arena for grounded decision-making processes. Territories, however, can also be the following: fuzzy,
65 non-homogeneous, non-consistent and non-contiguous, with disconnected nodes across linking spaces. To our
66 knowledge, EM formulation and practice has remained 'de-territorialized' and little research has been done to
67 provide a territory-oriented approach to link spatially explicit functional relationships between natural resources
68 and socio-economic driving forces.

69 The aim of this paper is to provide a territory-oriented approach to improve operationalization of Environmental
70 Management from a spatially explicit functional perspective. Specifically, we revisit the roots of the concept of
71 "Territory", hence developing a semantic map to introduce a novel approach, namely "Territorial Configuration".
72 Furthermore, the territorial configuration approach is discussed as a complementary pathway to turn the concept
73 of socioecological systems into effective management actions by providing sustainable science with a robust
74 geographic framework.

75 2 II.

76 3 Environmental Management Framework

77 Environmental Management (EM) is generally understood as the processes of decision making, planning,
78 administration, implementation and evaluation of human activities—purely driven by social actors such as
79 individuals, community or institutional aggregations—directed toward transforming nature into resources (Barrow
80 2006). Ideally, EM aims to maximize positive internalities (maximum profit) represented by social groups
81 (stakeholders) and natural resources (object of management) and to minimize negative externalities (minimum
82 environmental costs). The theoretical roots originally established by Patten (1978) refer to "Environmental" as
83 fluxes affecting a system, explicitly related to causes and effects impacting upon the original system state. EM
84 has now come to encompass natural capital conservation, watershed management, payment of ecosystem services
85 and environmental policy programs, among many other issues of sustainable science (Barrow 2006). EM has
86 evolved towards adaptive management and participatory approaches (Kapoor 2001), such that transdisciplinary
87 platforms are strongly recommended (Brand and Karvonen 2007). EM (sensu Margerum 1999) comprises two
88 significantly different connotations, namely, programs geared toward regulating access to resources (so-called
89 "administration" in English, whereas "gestión" and "gestión" in French and Spanish, respectively) and man-
90 made actions to transform nature (ecosystems) into resources (so-called "management" in English and French
91 or "manejo" in Spanish). Because of the two above-mentioned management connotations, two types of flows are
92 identified: top-down and bottom-up. The former is more related to policies, whereas the latter is oriented toward
93 nature transformation.

94 Lately, social and ecological sciences have been complemented and intermingled with the aim of increasing
95 effectiveness in EM (Young et al. 2006;Díaz et al. 2011). Ecological literature often reports inconsistent
96 spatial concepts, such as bioregions, ecozones, ecodistricts, biophysical units, ecoregions and ecosystems to denote
97 geographic framework (e.g. Margerum 1999; Barrow 2006). Other efforts refer to "Territory" as administrative
98 units (Loiseau et al. 2012) or arbitrary regions such as the Iberian Peninsula (Quintana et al. 2010). Upon
99 thorough review, it became evident that EM has largely neglected the concept of territory.

100 Two well-documented environmental management topics may serve to illustrate the previous statement, namely
101 biodiversity conservation and watershed management.

102 The establishment of protected areas? has recently emerged as the main environmental policy instrument
103 targeted at preserving ecosystem integrity and biodiversity conservation, as a response to the unprecedented rate
104 of species extinction (Pimm and Raven 2000). Conservation of hot spots and effective from the global viewpoint.

105 The development of this environmental management policy was clearly illustrated by Naughton et al. ??2005),
106 who documented the exponential increase in the number of parks established and the area under protection (in
107 the 1960s there were around 1,000 protected areas, and today there are over 100,000, covering about 20 million Km
108 ²). The effectiveness of protected areas worldwide, in spite of their clear spatial delimitation (Terborgh 2002),
109 has been largely controversial (Bruner et al. 2001; ??odriguez et al. 2004; Vallino 2014). Design, operation, law
110 enforcement and disengagement of local stakeholders are just a few of the main issues yet to become uniformly
111 effective within protected areas (Cumming et al. 2015). "Making parks work", as literally stated by Terborgh
112 (2002), became critical when studies showed that mega diverse regions harboring most global biodiversity hot
113 spots were the ones most ineffective (Brechin et al. 2003; management of protected areas have become critical
114 ??igueroa and Sanchez-Cordero 2008). In most cases, ineffectiveness has been related to the lack of enrolment
115 of key stakeholders with legal and legitimate jurisdiction and scope for decision making with whom negotiation
116 may take place with the aim of eventually engaging them as core allies (Kaimowitz and Sheil 2007; ??elazquez
117 et al. 2009) rather than as the major threat (Terborgh 2002; Redford et al. 2008).

118 The Watershed Management approach was initially a technical tool defined by hydrological processes with
119 tangible spatial boundaries, and it has recently transformed into a policy framework where watersheds are no
120 longer regarded as biophysical polygons, but rather as governance units ?? The negligence of a territory-oriented
121 approach in biodiversity conservation and watershed management is even more conspicuous within specific study
122 cases, such as the one in Mexico. a) Overview of biodiversity conservation and watershed management in Mexico.
123 Mexico, indisputably regarded as a mega diverse country (Sarukhan et al. 2015), adopted the biodiversity
124 conservation initiative by establishing protected areas. In the 1940s, Mexico set up 39 covering an area of
125 0.62% of the national territory, whereas, today, it has established 177, covering 13.04% of the country's area
126 (www.CONANP.gob.mx). The effectiveness of Mexican protected areas is controversial too. A limited number of
127 protected areas have been somewhat effective in some regions such as the Baja California Peninsula (Rosete et al.
128 2014), whereas other regions, such as the states of Chiapas, Oaxaca, Guerrero and Michoacan, have been rather
129 ineffective ??Figueroa and Sanchez-Cordero 2008). A top-down authoritarian commissioner governs Mexican
130 protected areas, each operated by a director. An advisory committee board (scholars, park administrators and
131 policy makers) supports to a greater or lesser degree from area to area the commissioner-director's decisions.
132 Regional and local stakeholders are mostly overlooked when management policies are designed, and, eventually,
133 these are dictated with the expectation that all concerned will govern themselves accordingly. It has been
134 documented that most outstanding Mexican biodiversity hot spots are not socially empty spaces (Bray and
135 Velázquez 2009; ??arukhan et al. 2015). Under these circumstances, novel territorial conservation strategies
136 based upon genuine engagement of regional and local stake (right) holders with whom agreements and need-
137 based negotiation strategies can be designed, have proved more promising. Protected areas should, therefore,
138 not be primarily targeted at preserving the integrity of pristine functional ecosystem processes or biodiversity
139 sinks, but rather regarded as strategies to reduce inequality and poverty, acting as vehicles of empowerment
140 ??Velázquez et al. 2009). As a result, natural resources are regarded by local communities as their natural
141 heritage and therefore fiercely conserved and defended (Brechin et al. 2003; ??ray and Velázquez 2009; Herner
142 2010).

143 Watershed Management in Mexico started in 1992 under the umbrella of the National Water Law known in
144 Mexico as the "Ley de Aguas Nacionales" (Ortiz-Rendón 1993). Consequently, national territory (1,973,000 km
145 ²) was split into 13 administrative hydrological regions. This environmental policy raised expectations as to
146 sound management for contrasting regions –either by managing hydrological excesses (recurrent floods) or deficits
147 (recurrent droughts) or by providing watershed management as an opportunity for regional development. In turn,
148 basin councils for decision-making were progressively installed, reaching 26 by 2015 (www.CONAGUA.gob.mx).
149 In practice, the National Water Commission, known as the "Comisión Nacional del Agua" enforced a top-down
150 vision in the composition of decision-making structures. Outcomes so far have shown that the capacity of basin
151 councils for institutional coordination and the opportunity for stakeholder collaboration have not fulfilled needs
152 and expectations (e.g. Moreno 2015). These failures remain in spite of manifested political will for tackling
153 national watershed problems (e.g. CONAGUA 2011).

154 4 III.

155 5 TERRITORY FRAMEWORK a) Conceptual Overview

156 The concept of territory emerged from the domain of human-political geography (Delaney 2005); and, according
157 to Elden (2010a), it has been used as a surrogate for land, plot, area and landscape, or as a noun to refer to a
158 specific jurisdiction (municipality, state, nation, country). According to ??antos (2001), "Territory" is the result
159 of historical interactions between socio-economic forces governing access to natural resources by establishing limits
160 through political, economic and cultural processes. In consequence, a "Territory" is under continuous construction
161 and derived by compartmenting the geographical continuum. Owing to the complex socio-economic processes
162 involved in constructing territories, the concept is clearly multipurpose ??Paasi 2003a). The concept of Territory
163 is core within the domain of geographical sciences and indisputably comprises polysemic interpretations. In
164 general terms, it refers to the process of engagement or appropriation of a given space by subjects (stakeholders).
165 The concept of territory now refers to an orderly humanized place where nature and culture are melded together

6 C) HIERARCHICAL TERRITORIAL LEVELS

166 through the influence of social institutions in charge of creating and implementing rules targeted at pursuing
167 stakeholders' actions (Raffestin and Butler 2012). Territory is, therefore, a state of power depicting habits,
168 traditions and access to the most critical resource, "the space". To claim there is a Territory, recognizable tangible
169 boundaries, functional or symbolically established borders, rules and levels of governance to enforce them must
170 be present (Elden 2010b;Herner 2010). In this way, engagement or appropriation harbors tangible, functional and
171 cultural territories and denotes a geographic continuum etched by the history of occupation and social meanings
172 (Fig. 1). A Territory-Oriented Approach to Operationilize Sustainable Management an established national
173 park or physical boundaries, such as a given watershed, where it is desired to implement a given policy. Tangible
174 (administrative) territories are delimited by clear boundaries, often supported by laws. Sovereignty is therefore
175 crucial and the construction of these territories and its permanence ranges from decades to centuries.

176 Functional territory types refer to spatial entities with changeable limits characterized by high internal
177 cohesion resulting from practical socio-economic processes derived from natural resource-stakeholder relationships
178 occurring within those given spatial entities (Amin 2004).There are two main types of functional territories: those
179 resulting from long-term endogenous process such as traditional productive systems (e.g., The Chakra [Hammen
180 1992] and The Chinampa [Parsons 1976]) and those largely driven by exogenous issues, such as global markets,
181 international agreements, and product prices, among others. To illustrate further, consider that a given spatial
182 entity is devoted to soy production. This spatial entity may change drastically if the price of the product drops
183 markedly as a result of global markets. In turn, the former functional territory will adapt to a new situation
184 and, in consequence, the geographic continuum will be re-configured (Peyrony and Denert 2012). Sun-grown
185 coffee, sugar cane, livestock production and mining are clearly other typical examples (Garces-Feliu et al. 2010).
186 Functional territories are delimited by a mosaic of fuzzy boundaries and their permanence ranges from years to
187 decades.

188 Cultural territory types arise when individual human beings, usually clustered in communities, establish
189 certain engagements or an identity with their spatial entity through symbolic representations. This representation
190 emerges from the inhabited history of the place resulting in cultural milestones (traditions), which indisputably
191 create a unique connection between individuals clustered in communities and their environment. Traditions
192 are built and internalized via socio-cognitive constructions, which govern daily life decisions (Herner 2010).
193 Generally, endogenous issues drive cultural territories. Examples comprise geographic entities sharing food habits,
194 a given language or a specific belief. The geographic continuum split by cultural territories is often intermingled,
195 since symbolic representations may not be shared homogeneously by all members of a given community and,
196 in consequence, they are not universally valid (Newman 1999). Within a given spatial entity, for instance, a
197 community may comprise individuals of the same ethnic group speaking a unique language; said individuals may,
198 nevertheless, not share the same religious beliefs. These symbolic representations, however, comprise the most
199 critical aspects of belonging and identity and therefore the essence of most human beings. Cultural territories
200 are delimited by a degree of fuzzy boundaries and their permanence ranges from centuries to millennia.

201 6 c) Hierarchical Territorial Levels

202 Hierarchical organization is an important issue in EM, and it has, for decades, been regarded as a cornerstone
203 of sustainable and ecological sciences (Kareiva and Wennergren 1995) as well as of social sciences (Lamont
204 and Molnár 2002). Within the domain of geography, hierarchical territorial levels are the following: local
205 (community-municipality), regional (state-subnational), national and supranational (Fig. 1). Scientific focus
206 on a specific hierarchical level has changed, such that, in the nineteen century, much attention was given to the
207 local and regional; in the twenty century, attention moved towards the national; for the last 30 years, planetary
208 environmental and socioeconomic issues have rekindled interest in territorial expressions at the supranational
209 level (Tuathail and Luke 1994). Hierarchical territorial levels are here described in order of jurisdiction, with
210 national first, followed by regional, local and, last but not least, supranational.

211 The national territorial level is primarily depicted by political and institutional processes and represents the
212 roots of most nation-states (Antonsich 2010). At a certain point, communities, in spite of their likely cultural
213 differences, gain identity. The notion of a nation hence emerges as a cultural identity of groups, which have
214 historically occupied certain defined spaces. The State governs by means of enforcing laws, which establish
215 control and vigilance over clearly defined spatial limits. These limits designate territorial division where the
216 State exercises sovereignty through legal jurisdictions (Berg and Kuusk 2010). National territories are delimited
217 by indisputably tangible boundaries, and exogenous and endogenous forces rule, such that the exogenous play
218 a key role in the recognition of sovereignty, whereas endogenous forces do so in the exercise of jurisdiction. At
219 this level, urban-rural centers share the ruling role, although this depends on the level of development. It is still
220 mostly centralized governments that take dictatorial decisions.

221 The regional territorial level (provinces or clusters thereof) is the result of a top-down administrative vision of
222 a nation-state, clearly tangible in their boundaries and aimed at enforcing laws, policies, programs and projects
223 (Baletti 2012). Territories at this level bring to mind the concept of territory as a demographic container (Taylor
224 1994) or political instrument where the State governs by attending to the local population's needs (Baletti
225 2012). In these territories, functional issues prevail (Allen and Cochrane 2007), whereas symbolic ones are hardly
226 relevant. To illustrate this, Paasi (2003) differentiated between "identity of a region" and "regional identity".
227 The former aims to enforce a political manipulation of the population or market-oriented objectives. The latter

228 is built from the consciousness and feelings of belonging of individuals as a result of a lengthy common history
229 (Jonas 2012). Regional territories are defined by tangible boundaries. If a nation is highly developed, decisions
230 prevail in urban areas; whereas decisions dominated by rural areas prevail if a nation is still developing.

231 The local territorial (municipal-communal or clusters thereof) level is constructed by a lengthy history of
232 occupation (several generations), where daily life traditional practices have prevailed. At this level, every spatial
233 entity is used, perceived, conceived and lived in by specific stake(right)holders in whom belonging, identity
234 and action converge (Governa and Salone 2004). Definitions of roles are fuzzy, since, for some practices, a
235 stakeholder forms part of one cluster (e.g., livestock producers), yet the same stakeholder may be part of another
236 cluster occupied with another functional activity (e.g., logging). Therefore, at this level, tangible, functional and
237 symbolic territories intermingle, donating life and spirit to the geographic continuum. Yet contested situations
238 are the rule rather than the exception. Local territorial level is not synonymous with indigenous community.
239 Other non-indigenous communities, such as pioneers, immigrants and even emigrants from their place of origin
240 currently expatriate may also qualify as local territory type communities as long as the time of occupation is long
241 enough explicitly to show their engagement and symbolic attachment to the geographic continuum established by
242 traditional practices created by the natural resource-man-made relationship. Urban neighborhoods sharing similar
243 socio-economic classes eventually turn into local territorial identities too. Indigenous communities, nonetheless,
244 often fit as excellent candidates if their traditional practices have not been significantly diminished.

245 Spatial boundaries of the local territorial level range from tangible to fuzzy owing to the fact that one spatial
246 unit may be devoted to multipurpose functions (Fig. 1). Local level is crucial for implementing actions and
247 is, in consequence, regarded as a motor of development at the municipal level (Jalomo-Aguirre 2009). At this
248 level, space is highly contested because it represents livelihoods and power. Decision-making is also contested,
249 such that open alliances with regional level decision makers are crucial to enforce laws. Because of the contested
250 prevailing framework, this level is rather vulnerable and often unstable in comparison with the regional, national
251 and supranational levels. At this level, rural-urban centers share the ruling role, while the rural ones prevail in
252 most developing countries.

253 The supranational territorial (global) level emerged through the configuration of clusters of nationstates (the
254 European Union, North American Free Trade Agreement, MERCOSUR) to address common economic interests,
255 taking into account historical and cultural backgrounds. These are predominantly tangible and gain territorial
256 functionality no longer through the notion of sovereignty, but rather through systems of planning, policies and
257 processes agreed upon by the governments of member nations. Supranational territories are mainly functionally
258 driven and allow the rise of so-called cross-border or trans-border regions, as the case of Western Europe
259 (Zonneveld and Stead 2007; Knipps child and Wiechmann 2012; Peyrony and Denert 2012). These territories have
260 also become relevant spatial entities for attending to environmental problems in order to minimize negative effects
261 as a result of their land-use practices affecting natural resources beyond their borders, sometimes jeopardizing
262 planetary sustainability (Conca 1994). In the symbolic dimension, these supranational territories are palpable in
263 contrasting ways. One of them is the ethno-territorial conflict where national identities are unrecognized through
264 divisions created by the limits of modern states. Conversely, advances in the reconstitution of symbolic territories
265 across state borders have been reached through the recovery of the cohesion based on historic identities as in
266 the case of the Catalan territoriality expressed in Spain, Andorra and France (Prytherch 2010). A number of
267 examples can be seen in the trans-boundary parks in Africa and shared river basins in Mexico and in the USA as
268 well as in many other instances where this supranational territorial level becomes relevant. At this level, urban
269 centers play the ruling role, since centralized governments make most decisions.

270 7 IV. Territorial Configuration Approach

271 We define territorial configuration (TC) as the array of tangible (administrative), functional and cultural
272 territories that co-exist and overlap across different hierarchical levels. In consequence, the geographic continuum
273 is dissected into territorial conglomerates delimited by a range of meaningful socio-historical boundaries. TC
274 harbors a unique array of stake(right)holders with legal and legitimate rights over the space (hereafter referred to
275 as spaceholders). Accordingly, it is unequivocally place-based dependent (Fig. 2). The Territorial Configuration
276 approach is meant to provide a common ground where both perspectives may match, namely, jurisdictions,
277 laws and normativity as well as belonging, identities, historical charge, contested spaces and socio-economic
278 functionality. B stands for blocks of countries clustered at supranational boundaries; C is for country boundaries;
279 R is for regional boundaries and L for local boundaries.

280 From a functional perspective, TC embraces multiple fluxes (matter, energy and information) controlling
281 unstable stages and changing processes throughout territorial conglomerates, thus resulting in non-linear
282 dynamics, such that outcomes are tagged with a high degree of uncertainty. These input-outputs change
283 into internalities or externalities when moving through territorial conglomerates along their path from their
284 departing point toward the endpoint (Fig. 2). Taking into account that fundamental issues in decision-making
285 on environmental management comprise consensus, collaboration and coordination, TC constitutes a benchmark
286 for unified space, function and spaceholders. Three underlying attributes of TC sustain this statement. First,
287 governing spaceholders are identified through their territorial engagement; second, spatially explicit relationships
288 are established to recognize internalities and externalities; third, a negotiation process among spaceholders can be

8 DISCUSSION

289 envisaged and strategic pathways leading toward the creation of territorial pacts and agreements may, therefore,
290 be established.

291 Ambiguity and uncertainty often result from uncoupling actions of the spaceholders, who are distributed across
292 all hierarchical territorial levels.

293 Because of the spatially explicit character of the TC, ambiguity and uncertainty are diminished because of
294 the need to understand that multiple resources are managed-administrated by multiple stakeholders distributed
295 along a geographic continuum where limits overlap. In response, sound communication is enhanced, and, trust is
296 established easing the implementation of environmental programs. Territorial configuration, in addition, serves
297 to identify key social actors from all territory types as well as any hierarchical level. By understanding the
298 arrangement and the pondered role of these key social actors, agreements, pacts, rules and eventually effective
299 EM may be pursued.

300 We further state that understanding TC implies admitting that no single EM action will be equally effective in
301 all spatial units. The Territorial Configuration approach here described, places the fact that any environmental
302 management action to be implemented will face opposition. The Territorial Configuration approach takes it as
303 implicit that bottom-up and topdown space holders might be brought together in order to design place-based
304 environmental policies, programs and actions. Consequently, tradeoffs and win-win scenarios are feasible as a
305 crucial first step to regulate access to spaces based on reciprocity, shifting to a needs-based rather than rights-
306 based negotiation strategy. To summarize, the Territorial Configuration approach provides meaningful grounds
307 for the processes of decision-making on environmental management (Fig. 3). Here we portray the cyclical
308 relationship between top-down and bottom-up approaches often unsuitable among institutional organizations,
309 space holders and places. TC conglomerates are crucial for governing national and supranational levels designing
310 policies to regulate access to natural resources (topdown vision). Complementary, bottom-up EM initiatives also
311 adapt their management to their TC. The probability of merging environmental policies with management actions
312 increases because both approaches share the same ground. In addition, because of the place-based institutional
313 framework, pacts, compromises and agreements needed to trigger management actions at regional and local
314 hierarchical territorial levels are feasible too. Environmental actions, even if these are articulated through top-
315 down and bottom-up approaches, trigger positive and negative internalities and externalities. Governing national
316 and supranational levels are able to assess the impact and eventually reorient EM toward sound environmental
317 programs. This dialectical relationship needs to be adapted on an ongoing basis, since TC is invariably changing.

318 V.

319 8 Discussion

320 Mexican environmental policy has largely neglected the concept of territory, and overemphasis has been placed
321 on concepts such as ecosystems and, recently, socio-ecological systems (Sarukhán et al. 2015). Environmental
322 management policies targeted at watersheds (Burgos and Bocco 2015) and biodiversity conservation (Bray et
323 al. 2005) are primarily designed following a top-down approach, disregarding TC conglomerates. Despite of all
324 these examples, successful medium-and long-term operation has yet to be ascertained. Disarticulated sector-
325 oriented policies increase uncertainty and diminish trust, such that weaknesses and failures are mainly found
326 in the implementation, monitoring and adaptation phases at regional and local levels (Figueroa and ??ánchez
327 Cordero 2008, Velazquez et al. 2009). Most regional and locally driven environmental management programs
328 lead to unsustainable actions, since political will (meaning economic and technical support) is not likely to
329 accommodate initiatives originating with local A Territory-Oriented Approach to Operationilize Sustainable
330 Management governments, even where legitimate decisions underlay (e.g. peasant reserves). Disruption of the
331 dialectical relationship between top-down and bottom-up processes increases the number and intensity of conflicts
332 among and across territorial conglomerates. In sum, Mexican environmental management initiatives have lacked
333 the dialectical relationship provided by the Territorial Configuration approach.

334 For a number of decades, the space concept in applied ecological sciences has remained a sticking point (Kareiva
335 and Wennergren 1995) and has often been regarded as a socially empty unit. The revisited concept of territory
336 portrayed here in a semantic map provides an overview of the multipurpose understanding of space. It is argued
337 that territory is a continuous process of spatial construction, permitting socioecological systems to be better
338 understood and eventually effectively managed by regarding the underlying Territorial Configuration. Various
339 authors (e.g., Pahl-Wostl 2009; Moss and Newig 2010) hold that the Territorial Configuration approach may serve
340 as a robust starting point from which to operationalize Environmental Management (Table 1). As previously
341 explained, territorial configuration encompasses a clear notion of space, spaceholders and tangible and cultural
342 proximal and multi-level governing processes (Mikulcak et al. 2013). Understanding this underlying complexity,
343 negotiations, pacts, agreements and reciprocal collaboration are feasible. The Territorial Configuration approach
344 implies reviewing the structure and composition of stakeholders involved in decisionmaking processes. Rather
345 than sector-oriented stakeholders, this approach empowers genuine and legitimate spaceholders to be enlisted so
346 that one common environment a lissue engages neighborhood, contagion and vicinity principles. This engagement
347 leads to pathways toward facilitating governance as a critical component so far over looked in most literature
348 related to Environmental Management (Newig and Fritsch 2008).To illustrate this further, ethnic, political
349 (power), economic and religion-driven cultural features have triggered some of the worst human environmental
350 transformations with global implications. These are the reasons why understanding territorial configuration of

351 space is crucial in finding reconciliatory paths for spaceholders to follow in order to construct new territories from
352 which innovative man-made actions may maximize environmental internalities and minimize externalities (Larson
353 2010). At this stage, governance and co-operation are likely to be included as a critical route to enforcing rules
354 for a common purpose (Lockwood 2010).

355 Robust construction between the Territorial Configuration approach and Environmental Management force
356 us to recall that, according to Aguilar (2009), public policy comprises four compulsory and sequential steps,
357 namely, identification of the target, design, implementation and monitoring-adaptation. In addition, Margerum
358 (2008) has pinpointed that frequent atomization and mismatches between sector-oriented policy formulations
359 at high organizational levels remain the major challenge in Environmental Management. Along this line, the
360 Territorial Configuration Approach provides the driving force and basis for environmental policy makers from
361 different sectors to articulate programs and actions. Policy makers should be geared toward common targets
362 according to specific territorial capabilities. Territorial capabilities imply identification of spaceholders who,
363 ideally, should participate actively in all four steps of the public policy cycle. Design of shared programs and
364 actions to be implemented with regard to specific spatial conditions reduce uncertainty and increase trust among
365 spaceholders ??Odom et al. 2015). In consequence, the ability to trigger negotiations and pacts in addition to
366 medium-and long-term agreements based upon mutual benefits is developed (Fisher et al. 2012). On the whole,
367 the Territorial Configuration more effective, concrete and operational framework, making the management of
368 negative externalities more efficient. Eventually, the Territorial Configuration approach should help to avoid
369 policies likely to be antagonistic. These often increase uncertainty and discourage spaceholders (Table 1 Scanty
370 perception of the process controlling the space as a social construction.

371 Geographic continuum dissected into territorial conglomerates delimited by a range of meaningfully socio-
372 historical liaison (e.g., place-belonging-engagement-control). Geographic framework is only conceived as pixels or
373 biophysical units leading to the disarticulation of ecological and geographical levels of organization.

374 Ecological and geographical levels of organization are clearly articulated throughout intermingled territorial
375 conglomerates.

376 Vagueness in depicting place-based exter(inter)nalities.

377 Stakeholders producing place-based positive or negative exter(inter)nalities are revealed.

378 **9 Composition of decision-making structures**

379 Dictating role of administrative (tangible) territories at high organizational levels (supra-national or regional)
380 illustrated by basin councils, advisor boards).

381 Non-tangible territories (functional and cultural) could be as well visualized, so that more comprehensive
382 decision-making structures can be integrated. Place-based key stakeholder are excluded when forming decision-
383 making structures (illustrated by contagion, updown, nested territories), diminishing likely negotiations.

384 Negotiation potential increase because weighted role of place-based key stakeholders are anticipated and based
385 upon specific environmental problems.

386 **10 Lack of legitimacy in decision making's**

387 structures due to the composition of decision makers often enrolled arbitrary.

388 **11 Increasing legitimacy because of the supported composition 389 of place-based decision makers. Capability for favoring 390 institutional (governmental) coordination**

391 Ill-coordinated, mismatched and ungrounded public environmental policies due to the fact that these are
392 sector-oriented.

393 Fitting public environmental policies to specific territorial configuration.

394 **12 Abilities for conducting collaboration**

395 Increase of uncertainty and distrust among stakeholders because environmental public policies are detached from
396 the reality of other.

397 Increase of certainty and trust among stakeholders when environmental public policies are devoted to common
398 territories so that from the reality of other are not mismatched. Lack of awareness of socio-cultural background
399 that limits collaboration between vertical and horizontal stakeholders.

400 Acknowledgment of territorial boundaries that favors collaboration for building territorial pacts, and vice
401 versa.

402 Facilitator fails as mediators in solving stakeholder's conflicts.

403 Stakeholder's conflicts may be solved through more effective strategies for building territorial pacts.

404 13 Efficiency for negative externalities management

405 A functional criterion for environmental externalities assessment uniquely weakens efficiency for implementation
406 of mitigation and control actions.

407 Integrated territorial environmental assessment for improving management of externalities among stake-
408 holder's responsibilities.

409 14 Coherence and dynamics for adaptive learning processes

410 Disconnected top-down and bottom-up processes so that contested situations prevailed.

411 Territorial Configuration approach constitutes a common ground for triggering dialectical relationships between
412 top-down and bottom-up decision making processes.

413 15 Conclusion

414 We state that the Territorial Configuration approach provides a sound geographic framework for linking a holistic
415 perception of natural resources as well as past and present socio-economic underlying forces. This approach
416 furthers, serves to resolve the misfit across multi-level state and non-state governance actors. The review on
417 Environmental Management and Territory concepts reveals that territorial configuration of space permits an
418 understanding of the complexity behind Environmental Management occurring along the geographic continuum.
419 Emphasis was given to considering reciprocal connections and dialectical relationships, which determine the
420 continuous construction of emerging territories. In order to reduce the conceptual mismatch between ecological
421 concepts and Environmental Management actions, we suggest a Territorial Configuration approach as a critical
422 pathway.

423 The outreach of the territory-oriented approach to operationalize Environmental Management in moving
424 forward sustainable science has yet to be ascertained (Miller et al. 2014). Other conceptual approaches so
425 far Top-down perspectives dominated by policy makers build the 'reality' around administrative territories at
426 high institutional levels. In contrast, bottom-up perspectives in regional and local spaceholders build their
427 'reality' around daily life practices derived from tangible, functional and cultural territory types carved out by
428 tacit-empirical knowledge. This mismatch is known as "levels of reality" within the transdisciplinary approach
429 (Nicolescu 2010). The Territorial Configuration approach provided here is meant to serve as common ground
430 where all perspectives can match, namely, jurisdictions, laws and normativity in addition to belonging, identities,
431 historical charge, contested spaces and socio-economic functionality. Contrasting levels of reality ought to be
432 brought together and this approach may serve to do so. This bridging effect refers to literally "the logic
433 of the included middle" described within the transdisciplinary approach by Nicolescu (2010). The Territory
434 Configuration approach may be considered as a surrogate of the included middle because it contains the logic of
435 administrative boundaries in the form of other territorial boundaries linked to different perceptions. Although
436 contrasting perspectives will remain, the building of a shared vision on environmental issues is likely as a
437 consequence of re-connecting the dialectic relationship between topdown and bottom-up perspectives (Table
438 1 and Fig. 3). This has been identified as the core of the multi-level governance framework ?? de-territorialized,
439 such as socio-economic systems, governance and resilience fostering sustainable transitions may also be enriched
440 (Folke et al. 2011; Fabinyi et al. 2014; Norström et al. 2014). It is, therefore, concluded that neither ecosystem nor
441 socio-ecological system concepts have encompassed a robust platform around which key spaceholders can unite. It
442 is certain, however, that these previous approaches lacked a sound geographic perspective and therefore practical
443 implementation is becoming a burden that needed to be transformed into an opportunity.

Hierarchical Territorial Levels	Territory types		
	Space conformed by blocks of Nation-States, such as (sub)continents to reach common goals; often political-economical liaisons underlay the existence of these (e.g., North-America, European Union).	Functional /relational space sharing economical and cultural features expressed in trans-national corporations meant to control their territory and beyond (e.g., Members of the Commonwealth).	Space across boundaries of modern nation- states sharing identity and sense of belonging (e.g., Catalan and Maya cultures).
	Space tied by political, institutional and jurisdictional aspects, unequivocally sharing historical and political processes that resulted in the emergence of the Nation-State (e.g., Ireland, Belgium).	Space ruled by supreme authority and recognized sovereignty who design and enforce laws by their own means which creates a unique government structure (e.g., USA, Russia, Cuba)	Space literally gained by historical and cultural processes with long inhabiting history and coupled with modern nation-states, boundaries often beyond jurisdiction (e.g., Guatemala and partly Mexico)
	Space delimited by a group of intra-national jurisdictions mostly useful for enforcing public policies and controlling access by administrative regulations (e.g., Sao Paulo, Brazil, or Quebec, Canada).	Space with fuzzy boundaries based upon productive networks and economical relationships between stakeholders and resources. Boundaries may go beyond legal jurisdiction (e.g., The Silicon Valley, USA).	Space consciously delimited, reinforcing daily practices and mutual respect expressed in identities distinctive within a given nation-state (e.g., Quechua and Canadian first nation regions)
	Space delimited by legal legitimacy as the minor administrative jurisdiction of a nation-state. These comprised land tenure (private or communal) clusters (e.g., The Outaouais, in Canada).	Space delimited by daily productive practices; land systems crafted by people with oral, legal or traditional rights. Some practices implicitly comprise overlapped of stakeholders (e.g., Avocado plantations in Michoacán, Mexico).	Space with strong social-land engagement given by family or communal histories, which creates liaisons of belonging, identity and symbolic meanings (e.g., small tribal groups in Amazonia, Brazil; urban neighborhoods).

Figure 1: Figure 1 :

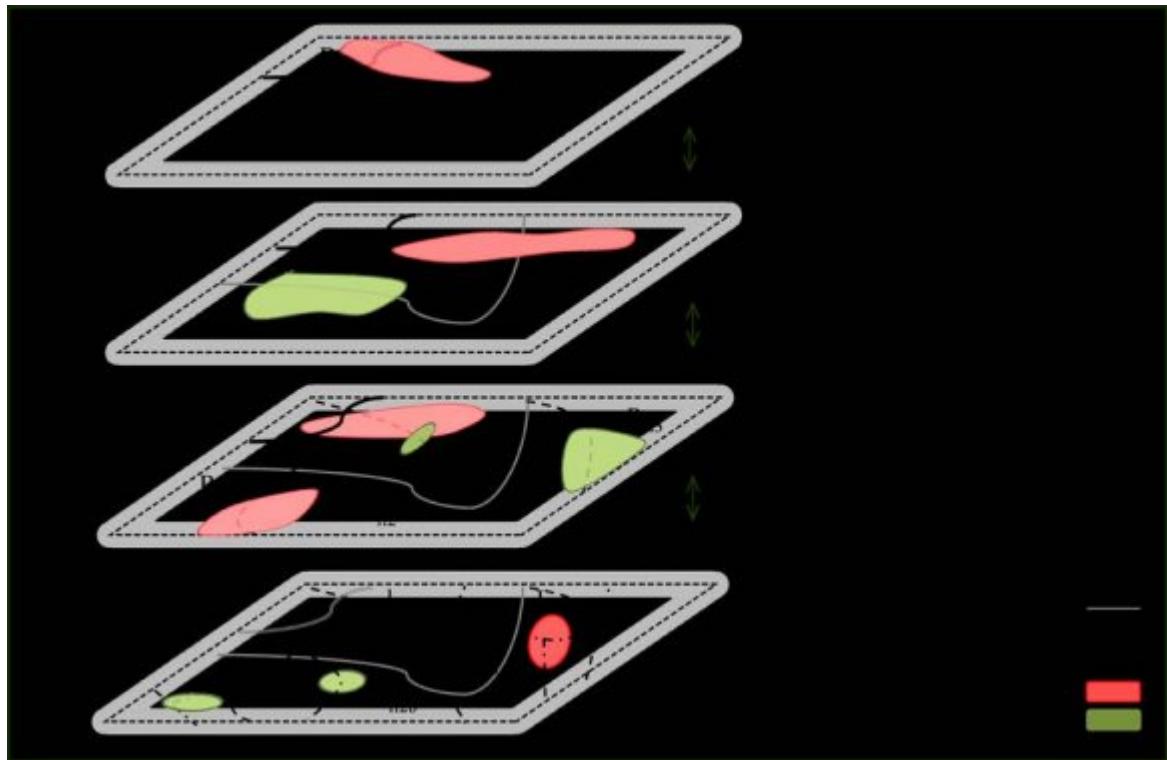


Figure 2:

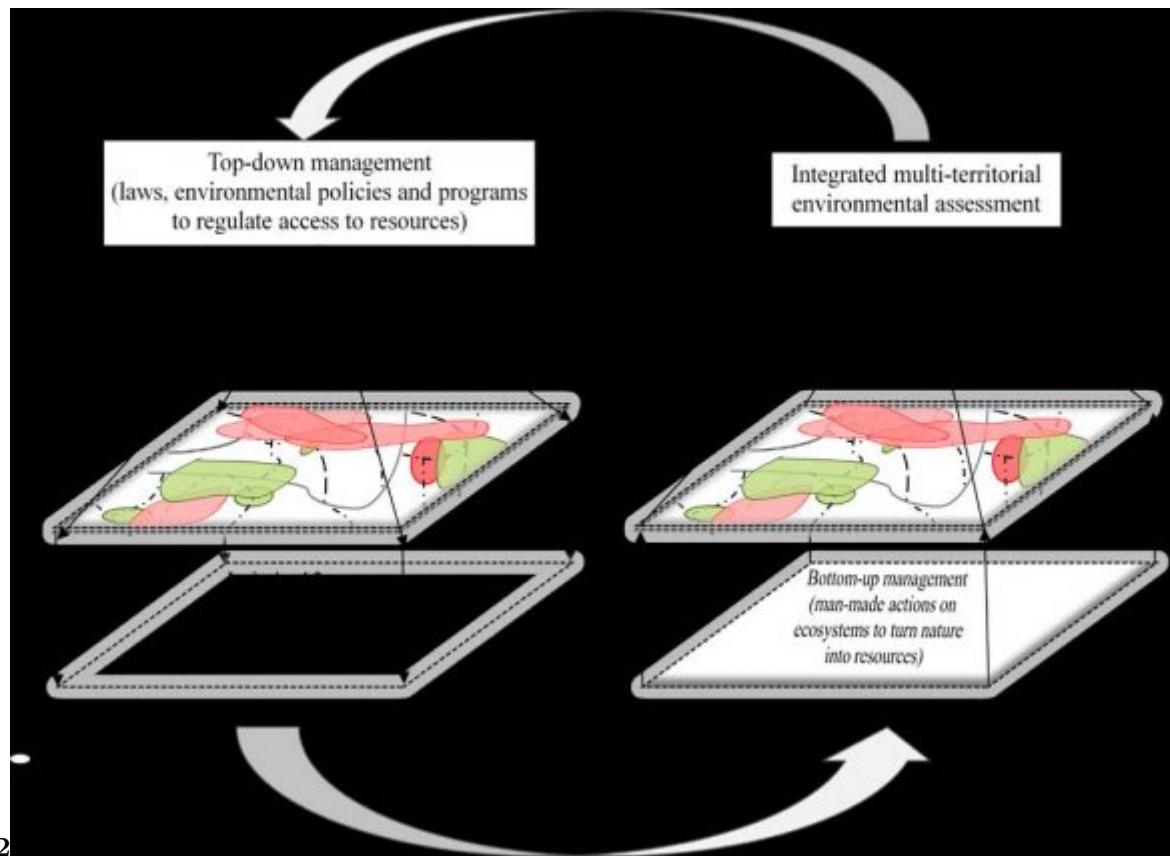


Figure 3: Figure 2 :

1

approach may drive Environmental Management into a

Figure 4: Table 1 :

444 .1 Acknowledgments

445 [Odom et al.] , O Odom , A S Garmestani , C R Allen , L H Gunderson , J B Ruhl , C A Arnold , NA .

446 [Folke et al. ()] , C Folke , Å Jansson , J Rockström , P Olsson , S R Carpenter , F Stuart Chapin , Iii , A S
447 Crepin , G Daily . *Ambio* 2011. 40 p. . (Reconnecting to the biosphere)

448 [Newman (ed.) ()] *A Companion to Political Geography*, D Newman . J. Agnew, K. Mitchell, and G. Toal (ed.)
449 2003. Blackwell Publishing Ltd. (Boundaries. Pages 123-137)

450 [Pahl-Wostl ()] 'A conceptual framework for analyzing adaptive capacity and multi-level learning processes in
451 resource governance regimes'. C Pahl-Wostl . *Global Environmental Change* 2009. 19 (3) p. .

452 [Turner et al. ()] 'A framework for vulnerability analysis in sustainability science'. B L Turner , R E Kasperson ,
453 P A Matson , J J McCarthy , R W Corell , L Christensen , A Schiller . *Proceedings of the National Academy
454 of Sciences* 2003. 100 (14) p. .

455 [Quintana et al. ()] 'A model for assessing habitat fragmentation caused by new infrastructures in extensive
456 territories-Evaluation of the impact of the Spanish strategic infrastructure and transport plan'. S M Quintana
457 , B M Martin-Ramos , M C Martínez , I O Pastor . *Journal of Environmental Management* 2010. 91 (5) p. .

458 [Margerum ()] 'A typology of collaboration efforts in environmental management'. R D Margerum . *Environ-
459 mental Management* 2008. 41 (4) p. .

460 [Fazey et al. ()] 'Adaptive capacity and learning to learn as leverage for social-ecological resilience'. J Fazey , J
461 Fischer , K Sherren , J Warren , J Noss , DoversS . *Frontiers in Ecology and the Environment* 2007. 5 p. .

462 [Huitema et al. ()] 'Adaptive water governance: assessing the institutional of adaptive (co-) management from a
463 governance perspective and defining a research agenda'. D Huitema , E Mostert , W Egas , S Moellen Kamp
464 , C Pahl-Wostl , YalcinR . *Ecology and Society* 2009. 14 (1) p. 26.

465 [Eshragh et al. ()] 'Automated negotiation in environmental resource management: Review and assessment'. F
466 Eshragh , M Pooyandeh , D J Marceau . *Journal of Environmental Management* 2015. 162 p. .

467 [Graham et al. ()] 'Barriers and bridges to the integration of social-ecological resilience and law'. B Graham , D
468 G Cosens , B C Angeler , Chaffin , C S Holling . *Frontiers in Ecology and the Environment* 2015. 13 p. .

469 [Allen and Cochrane ()] 'Beyond territorial fix: regional assemblages, politics and power'. J Allen , A Cochrane
470 . *Regional Studies* 2007. 41 p. .

471 [Velázquez et al. ()] 'Building participatory landscape-based conservation alternatives: a case study of Mi-
472 choacán'. A Velázquez , E M Cué-Bär , A Larrazábal , N Sosa , J L Villaseñor , M Mccall , G Ibarra-Manríquez
473 . Mexico. *Applied Geography* 2009. 29 p. .

474 [Benson et al. ()] 'Collaborative environmental governance: are watershed partnerships swimming or are they
475 sinking?'. D Benson , A Jordan , H Cook , SmithL . *Land Use Policy* 2013. 30 p. .

476 [Conagua ()] Conagua . <http://www.conagua.gob.mx/CONAGUA07/Temas/AgendadelAgua2030.pdf>
477 Water Agenda 2030. Secretaria de Medio Ambiente, (Mexico (in Spanish) 2011. (Recursos Naturales y Pesca
478 (SEMARNAT))

479 [Kareiva ()] 'Connecting landscape patterns to ecosystem and population processes'. P Kareiva , WennergrenU
480 . *Nature* 1995. 373 p. .

481 [Kaimowitz and Sheil ()] *Conserving what and for whom? Why conservation should help meet basic human needs
482 in the tropics*, D Kaimowitz , D Sheil . 2007. 39 p. .

483 [Brechin et al. ()] *Contested nature: promoting international biodiversity with social justice in the twenty-first
484 century*, S R Brechin , C L Fortwangler , P R Wilshusen , WestP C . 2003. Suny Press.

485 [Wu ()] 'Cross-disciplinarity, landscape ecology, and sustainability science'. J Wu . *Landscape Ecology* 2006. 21
486 p. .

487 [Figueroa and Sánchez-Cordero ()] 'Effectiveness of natural protected areas to prevent land use and land cover
488 change in Mexico'. F Figueroa , V Sánchez-Cordero . *Biodiversity and Conservation* 2008. 17 p. .

489 [Bruner et al. ()] 'Effectiveness of parks in protecting tropical biodiversity'. A G Bruner , R E Gullison , R E
490 Rice , Da Fonseca , GA . *Science* 2001. 91 p. .

491 [Rodrigues et al. ()] 'Effectiveness of the global protected area network in representing species diversity'. A S
492 Rodrigues , S J Andelman , M I Bakarr , L Boitani , T M Brooks , R M Cowling , L D C Fishpool7 , G A B
493 Da Fonseca , K J Gaston , M Hoffmann1 , J S Long , P A Marquet , J D Pilgrim , R L Pressey , J Schipper
494 , W Sechrest , S N Stuart , L G Underhill , R W Waller , M E J Watts , YanX . *Nature* 2004. 428 (6983) p. .

495 [Muste et al. ()] 'End-to-end cyber infrastructure for decision-making support in watershed management'. M V
496 Muste , D A Bennett , S Secchi , J L Schnoor , A Kusiak , N J Arnold , S K Mishra , S M Asce , D Ding ,
497 RapoluU . *Journal of Water Resources Planning and Management* 2012. 139 (5) p. .

498 [Loiseau et al. ()] 'Environmental assessment of a territory: An overview of existing tools and methods'. E Loiseau
499 , G Junqua , P Roux , V Bellon-Maurel . *Journal of Environmental Management* 2012. 112 p. .

500 [Fish ()] 'Environmental decision making and an ecosystems approach some challenges from the perspective of
501 social science'. R D Fish . *Progress in Physical Geography* 2011. 35 p. .

502 [Newig ()] *Environmental governance: Participatory, multi-level -and effective?* UFZ Diskussionspapiere No, J
503 Newig , FritshO . 2008. 2008.

504 [Barrow ()] *Environmental Management for Sustainable Development*, C J Barrow . 2006. Routledge, London
505 and New York.

506 [Zonneveld and Stead ()] 'European territorial co-operation and the concept of urbanrural relationships'. W
507 Zonneveld , D Stead . *Planning, Practice and Research* 2007. 22 p. .

508 [Brand ()] 'Focusing the meaning (s) of resilience: resilience as a descriptive concept and a boundary object'. F
509 S Brand , JaxK . *Ecology and Society* 2007. 12 p. 23.

510 [Aguilar ()] 'Framework for the analysis of public policies'. L F Aguilar . *Public policy and democracy in Latin
511 America: from the analysis to the implementation*, F Coord, V Mariñez, Graza, Egap-Cerale-Porrúa (ed.)
512 (México) 2009. (in Spanish)

513 [Bray and Velázquez ()] 'From Displacement-Based Conservation to Place-Based Conservation. The Case of
514 Community Forest Management'. D B Bray , A Velázquez . *Conservation and Society* 2009. 7 p. .

515 [Garces-Feliu and O'brien ()] 'From mining location to the continental space'. E Garces-Feliu , J O'brien ,
516 CooperM . *Revista Eure* 2010. 36 p. .

517 [Lockwood ()] 'Good governance for terrestrial protected areas: a framework, principles and performance
518 outcomes'. M Lockwood . *Journal of Environmental Management* 2010. 91 p. .

519 [Fischer et al. ()] 'Human behavior and sustainability'. J Fischer , R Dyball , I Fazey , C Gross , S Dovers , P R
520 Ehrlich , R J Brulle , C Christensen , R J Borden . *Frontiers in Ecology and the Environment* 2012. 10 p. .

521 [Ostrom ()] 'Institutions and the Environment'. E Ostrom . *Economic Affairs* 2008. 28 (3) p. .

522 [Margerum ()] 'Integrated Environmental Management: the foundations for successful practice'. R D Margerum
523 . *Environmental Management* 1999. 24 p. .

524 [Mikulcak et al. ()] 'Integrating rural development and biodiversity conservation in Central Romania'. F Mikul-
525 cak , J Newig , A I Milcu , T Hartel , J Fischer . *Environmental Conservation* 2013. 40 (02) p. .

526 [Cash et al. ()] 'Knowledge systems for sustainable development'. D W Cash , W C Clark , F Alcock , N M
527 Dickson , N Eckley , D H Guston , MitchellR B . *Proceedings of the National Academy of Sciences* 2003. 100
528 p. .

529 [Elden] 'Land, terrain, territory'. Elden . *Progress in Human Geography* 34 p. .

530 [Díaz et al. ()] 'Linking functional diversity and social actor strategies in a framework for interdisciplinary
531 analysis of nature's benefits to society'. S Díaz , F Quétier , D M Cáceres , S F Trainor , N Pérez-Harguindeguy
532 , M S Bret-Harte , L Poorter . *Proceedings of the National Academy of Sciences* 2011. 108 (3) p. .

533 [Jalomo-Aguirre ()] 'Local development in metropolitan contexts'. F Jalomo-Aguirre . *Revista Polis* 2009. 22 p. .

534 [Terborgh ()] *Making parks work: strategies for preserving tropical nature*, J Terborgh . 2002. Island Press.

535 [Larson ()] 'Making the 'rules of the game': constituting territory and authority in Nicaragua's indigenous
536 communities'. A Larson . *Land Use Policy* 2010. 27 p. .

537 [Nicolescu ()] 'Methodology of transdisciplinarity -levels of reality, logic of the included middle and complexity'.
538 B Nicolescu . *Transdisciplinary Journal of Engineering and Science* 2010. 1 (1) p. .

539 [Bray et al. ()] 'Mexico's Community Forests'. D B Bray , A Velázquez , J F Mas , DuránE . *Conservation in
540 Practice* 2005. 6 p. .

541 [Rosete et al. ()] 'Multi-scale landcover dynamics of semiarid scrubland in Baja California'. F A Rosete , A
542 Velázquez , G Bocco , Espejell . *Mexico. Regional Environmental Change* 2014. 14 (4) p. .

543 [Moss ()] 'Multilevel water governance and problems of scale: Setting the stage for a broader debate'. T Moss ,
544 NewigJ . *Environmental Management* 2010. 46 (1) p. .

545 [Baletti ()] 'Ordenamento Territorial: neodevelopmentalism and the struggle for territory in the lower Brazilian
546 Amazon'. B Baletti . *Journal of Peasant Studies* 2012. 39 p. .

547 [Liverman et al. ()] *People and pixels: linking remote sensing and social science*, D Liverman , E F Moran , R
548 R Rindfuss , P C Stern . 1998. Washington, DC: National Academy Press.

549 [Peyrony ()] 'Planning for cross-border territories: the role played by spatial information'. J Peyrony , DenertO
550 . *Raumforsch Raumordn* 2012. 70 p. .

551 [Tuathail ()] 'Present at the (dis) integration: deterritorialization and reterritorialization in the'. G Tuathail ,
552 LukeT . *New World Order. Annals of the Association of American Geographers* 1994. 84 p. .

553 [Newman ()] 'Real spaces, symbolic spaces: Interrelated notions of territory in the Arab-Israeli conflict'. D
554 Newman . *Territorial Dimensions of International Conflict: A Road Map to War*, P Diehl (ed.) (Nashville
555 Tennessee) 1999. Vanderbilt University Press.

556 [Paasi ()] 'Region and place: regional identity in question'. A Paasi . *Progress in Human Geography* 2003. 27 p. .

557 [Jonas ()] 'Region and place: regionalism in question'. A Jonas . *Progress in Human Geography* 2012. 36 p. .

558 [Amin ()] 'Regions unbound: towards a new politics of place'. A Amin . *Geografiska Annaler B* 2004. 86 p. .

559 [Ortiz-Rendón ()] 'Relevant original concepts of the Law of National Waters'. G Ortiz-Rendón . *ingeniería
560 Hidráulica en México* enero 1993. p. .

561 [Conacher ()] 'Resources and Environmental Management. Some fundamental concepts and definitions'. A J
562 Conacher . *Perspectives in Resources Management in Developing Countries*, B Thakur (ed.) (New Delhi)
563 2003. Concept Publishing Company. 1 p. .

564 [Antonsich ()] 'Rethinking territory'. M Antonsich . *Progress in Human Geography* 2010. 34 p. .

565 [Conca ()] 'Rethinking the ecology-sovereignty debate. Millenium'. K Conca . *Journal of International Studies*
566 1994. 23 p. .

567 [Molle ()] 'River-basin planning and management: The social life of a concept'. F Molle . *Geoforum* 2009. 40 (3)
568 p. .

569 [Fabinyi and Evans ()] 'Socialecological systems, social diversity, and power: insights from anthropology and
570 political ecology'. M Fabinyi , L Evans , FoaleS J . *Ecology and Society* 2014. 19 p. 28.

571 [Geoghegan et al. ()] *Socializing the pixel' and 'pixelizing the social: In People and pixels: linking remote sensing
572 and social science*, J Geoghegan , L Pritchard , Y Ogneva-Himmelberger , R R Chowdhury , S Sanderson ,
573 TurnerB L . 1998. p. . National Academy of Sciences

574 [Raffestin and Butler ()] *Space, territory, and territoriality. Environment and Planning D: Society and Space*, C
575 Raffestin , S A Butler . 2012. 30 p. .

576 [Sarukhán et al. ()] 'Strategic actions to value, conserve, and restore the natural capital of mega diversity
577 countries: the case of Mexico'. J Sarukhán , T Urquiza-Haas , P Koleff , J Carabias , R Dirzo , E Ezcurra ,
578 S Cerdeira-Estrada , Soberónj . *BioScience* 2015. 65 (2) p. .

579 [Gregory et al. ()] *Structured decision making: a practical guide to environmental management choices*, R
580 Gregory , L Failing , M Harstone , G Long , T Mcdaniels , OhlsonD . 2012. John Wiley and Sons.

581 [Knippschild ()] 'Supraregional partnerships in large cross-border areas-toward a new category of space in
582 Europe?'. R Knippschild , WiechmannT . *Planning Practice and Research* 2012. 27 p. .

583 [Komiyama and Takeuchi ()] 'Sustainability science: building a new discipline'. H Komiyama , K Takeuchi .
584 *Sustainability Science* 2006. 1 (1) p. .

585 [Newig et al. ()] 'Synapses in the network: learning in governance networks in the context of environmental
586 management'. J Newig , D Günther , C Pahl-Wostl . *Ecology and Society* 2010. 15 (4) p. 24.

587 [Patten ()] 'System approach to the concept of environment'. B Patten . *Ohio Journal of Science* 1978. 78 p. .

588 [Governa and Salone ()] 'Territories in action, territories for action: the territorial dimension of Italian local
589 development policies'. F Governa , C Salone . *International Journal of Urban and Regional Research* 2004. 28
590 p. .

591 [Delaney ()] *Territory: a short introduction*, D Delaney . 2005. Carlton, Australia: Blackwell Publishing.

592 [Margerum ()] 'The challenges and implications of collaborative management on a river basin scale'. R D
593 Margerum , WhitallD . *Journal of Environmental Planning and Management* 2004. 47 (3) p. .

594 [Claval ()] 'The cultural approach and geographic notions of space'. P Claval . <http://bibliotecadigital.academia.cl/handle/123456789/574> *Boletín de la A.G.E* 2002. 34 p. . (in Spanish)

595 [Brand ()] 'The ecosystem of expertise: complementary knowledges for sustainable development'. R Brand ,
596 KarvonenA . *Sustainability: Science, Practice and Policy* 2007. 3 p. .

597 [Miller et al. ()] 'The future of sustainability science: a solutions-oriented research agenda'. T R Miller , A Wiek
598 , D Sarewitz , J Robinson , L Olsson , D Kriebel , LoorbachD . *Sustainability Science* 2014. 9 (2) p. .

599 [Young et al. ()] 'The globalization of socio-ecological systems: An agenda for scientific research'. O R Young ,
600 F Berkhout , G Gallopin , M A Janssen , E Ostrom , S Van Der Leeuw . *Global Environmental Change* 2006.
601 16 p. .

602 [Hammen ()] 'The management of the world: nature and society between the Yukuna of the Colombian Amazon'.
603 M C Hammen . *Tropenbos* 1992. (in Spanish)

604 [Santos ()] 'The nature of space: technique and time, reason and emotion'. M Santos . *Editorial Ariel* 2000.

605 [Parsons ()] 'The Role of Chinampa Agriculture in the Food Supply of Aztec Tenochtitlan'. J Parsons . *Cultural
606 Change and Continuity*, C Clell (ed.) (New York) 1976. Academic Press.

607

608 [Naughton-Treves and Holland ()] 'The role of protected areas in conserving biodiversity and sustaining local
609 livelihoods'. L Naughton-Treves , M B Holland , BrandonK . *Annual Review of Environmental Resources*
610 2005. 30 p. .

611 [Taylor ()] 'The state as container: territoriality in the modern world-system'. P Taylor . *Progress in Human
612 Geography* 1994. 18 p. .

613 [Lamont ()] 'The study of boundaries in the social sciences'. M Lamont , MolnárV . *Annual Review of Sociology*
614 2002. p. .

615 [Herner ()] 'The theory of social representations: an approach from Geography'. M T Herner . *Revista* 2010. 34
616 p. .

617 [Vallino ()] 'The tragedy of the park: an agentbased model of endogenous and exogenous institutions for forest
618 management'. E Vallino . *Ecology and Society* 2014. 19 (1) p. 35.

619 [Cohen ()] 'The watershed approach: Challenges, antecedents, and the transition from technical tool to
620 governance unit'. A Cohen , DavidsonS . *Water Alternatives* 2011. 4 p. .

621 [Elden ()] 'Thinking territory historically'. S Elden . *Geopolitics* 2010b. 15 p. .

622 [Norström et al. ()] 'Three necessary conditions for establishing effective Sustainable Development Goals in the
623 Anthropocene'. A V Norström , A Dannenberg , G Mccarney , M Milkoreit , F Diekert , F , G Engström , R
624 Fishman , J Gars , E Kyriakopoulou , V Manoussi , K Meng , M Metian . *Ecology and Society* 2014. 19 (3)
625 p. 8.

626 [Kapoor ()] 'Toward participatory environmental management'. I Kapoor . *Journal of Environmental Manage-
627 ment* 2001. 63 p. .

628 [Lang et al. ()] 'Transdisciplinary research in sustainability science: practice, principles, and challenges'. D J
629 Lang , A Wiek , M Bergmann , M Stauffacher , P Martens , P Moll , M Swilling , C J Thomas . *Sustainability
630 Science* 2012. 7 (1) p. .

631 [Moreno et al. ()] 'Transfer of water and social conflict in the Yaqui River Basin'. J L Moreno , Coord , A
632 Burgos , G Bocco , J Sosa-Ramirez . <http://www.ciga.unam.mx/publicaciones> *Social Dimensions in
633 Watershed Management*, (Morelia, Mexico) 2015. p. . (in Spanish)

634 [Cumming et al. ()] 'Understanding protected area resilience: a multi-scale, socialecological approach'. G
635 Cumming , C , R Allen , N C Ban , D Biggs , H C Biggs , D H Cumming , A Vos , G Epstein , M
636 Etienne , K Maciejewski , R Mathevot , C Moore , M Nenadovic , SchoonM . *Ecological Applications* 2015.
637 25 p. .

638 [Prytherch ()] 'Vertebrating the region as networked space of flows: learning from the spatial grammar of
639 Catalinst territoriality'. D Prytherch . *Environment and Planning A* 2010. 42 p. .

640 [Castro ()] 'Water governance in the twentieth-first century'. J E Castro . *Ambiente and Sociedade* 2007. 10 p. .

641 [Burgos et al. ()] 'Watershed as geographic space'. A Burgos , G Bocco , G Burgos , J Bocco , Sosa-Ramirez
642 . <http://www.ciga.unam.mx/publicaciones> *Social Dimensions in Watershed Management*, (Morelia,
643 Mexico) 2015. p. . (in Spanish)

644 [Redford et al. ()] 'What is the role for conservation organizations in poverty alleviation in the world's wild
645 places'. K H Redford , M A Levy , E W Sanderson , A De Sherbinin . *Oryx* 2008. 42 p. .